

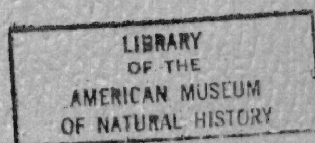
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ABSTRACT

Elosia duidensis Rivero is reassigned to the tribe Eleutherodactylini (subfamily Telmatobiinae) because it lacks the distinctive suite of features of the Elosiinae. A new genus, *Dischidodactylus*, is proposed

for *Elosia duidensis*. The relationships of the genus are obscure but may be with one of the three species groups of *Eleutherodactylus* distributed in eastern Brazil.

INTRODUCTION

The leptodactylid frogs of the subfamily Elosiinae form a compact group of some 18 species distributed in lowland and montane forests of southeastern Brazil (Noble, 1931; Cochran, 1955; Lynch, 1971). A few authors have suggested that the group is distributed elsewhere. Beebe (1919) reported the existence of a Guyanan *Crossodactylus* but the record has been ignored because no material was available. Rivero (1964) mentioned that the late Emmett R. Dunn wrote him concerning the presence of an elosiine on the Guyanan cerros. Later, Rivero (1968) reported four specimens in the American Museum of Natural History collections (presumably those noted earlier by Dunn) and named them *Elosia duidensis*. Rivero pointed out the considerable differences between *E. duidensis* and the Brazilian elosiines as well as the resemblances of *E. duidensis* to eleutherodactyline frogs. Lynch (1971)

and Heyer (1975) briefly commented on the geographic hiatus separating the Brazilian and Venezuelan forms. The rarity of the Venezuelan frog precluded a review of its relationships.

During a visit to the American Museum of Natural History, I discovered a fifth specimen of the Venezuelan species among the unidentified material from the Tate-Duida expedition. An Alizarin skeleton was prepared from the specimen (AMNH 23198), which had dried out and been rehydrated at least once during its nearly 50 years of storage. It is a gravid female 28.5 mm. in snout-vent length having four and six large (1.9-2.4 mm.) ovarian eggs (right and left ovaries, respectively).

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Drs. Charles W. Myers and Richard G. Zweifel provided facilities during my visit to

¹Associate Professor of Zoology, School of Life Sciences, the University of Nebraska-Lincoln, Lincoln, Nebraska.

the American Museum of Natural History. They likewise permitted preparation of an Alizarin skeleton of one specimen of *Dischidodactylus duidensis* and lent me other specimens. The University of Nebraska Research Council provided funds to enable me to study the collections at the American Museum of Natural History.

THE ELOSIINAE

The Elosiinae is comprised of three distinct genera (*Crossodactylus*, *Hylodes*, and *Megaelosia*) of frogs distributed in the Serra do Mar region of Brazil. Of the four subfamilies of the Neotropical Leptodactylidae recognized by

Lynch (1971), the Elosiinae is perhaps the most indisputably distinct. Elosiine frogs differ from all other leptodactylids in having prominent digital fringes (fig. 1), flaplike inner tarsal folds, and a pair of prominent scutes atop each digital pad. Although not diagnostic, a series of additional character-states exhibited by elosiines combine to render the group easily distinguished from other leptodactylids, namely, protruding snout (fig. 2), sharp canthus rostralis, usually prominent tympana (partially concealed in *Megaelosia*), round palmar tubercles (fig. 1), T-shaped terminal phalanges, and smooth skin on the throat and venter. Osteological traits contributing to the unique combination include small, widely separated nasal bones overlying a

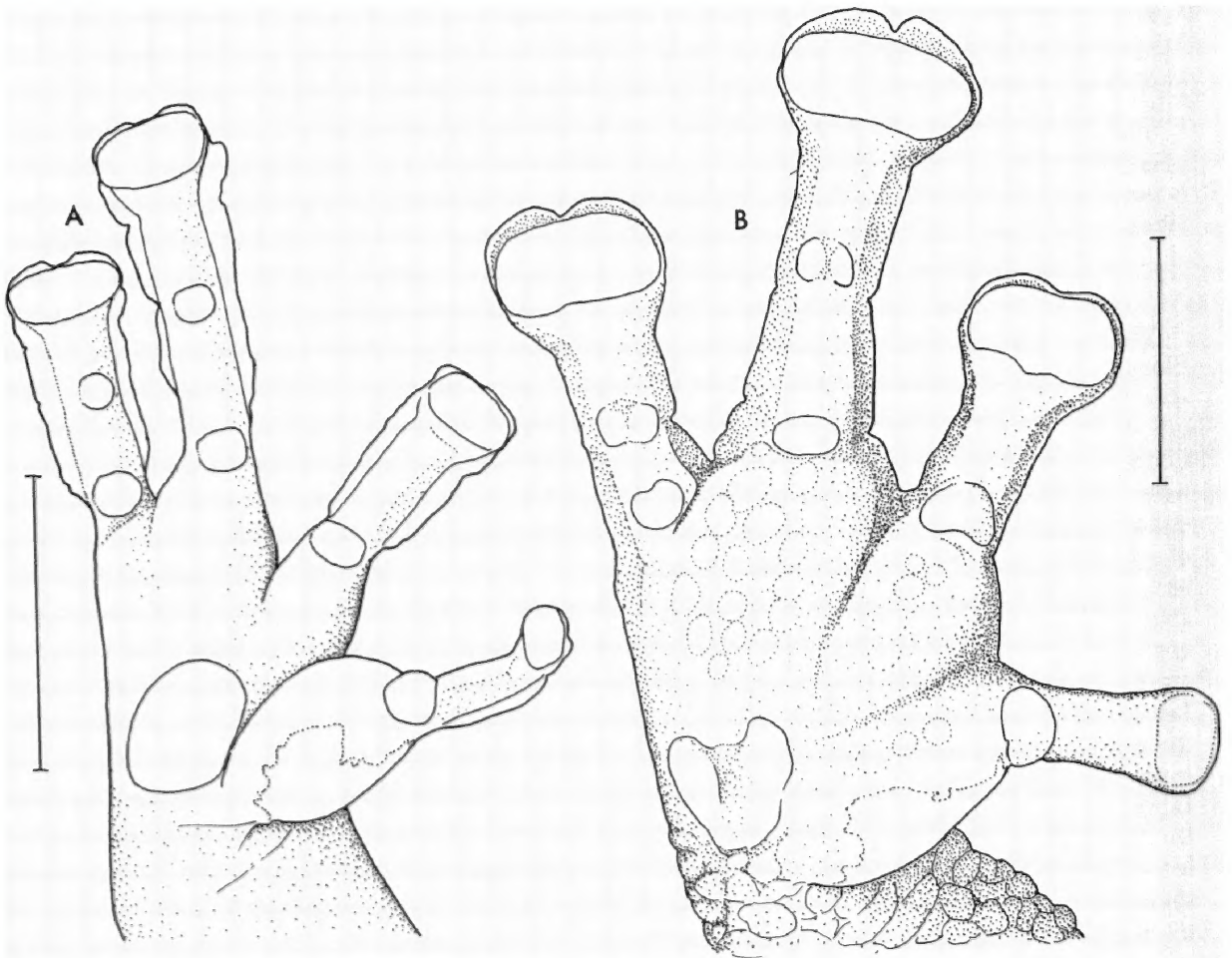


FIG. 1. Palmar views of right hands of (A) male *Hylodes asper*, AMNH 52187, and (B) male *Dischidodactylus duidensis*, AMNH 23194. Line for A equals 5 mm., for B 2 mm.

large sphenethmoid, frontoparientals completely occluding fontanelles, and poorly ossified vertebral column (Lynch, 1971).

The three elosiine genera are well separated. Male *Crossodactylus* have prominent nuptial spines and single subgular vocal sac. *Crossodactylus* lack vomerine odontophores and lack quadratojugals. Male *Hylodes* have

thin-walled, paired, lateral vocal sacs but lack keratinized nuptial asperities. *Hylodes* and *Megaelosia* have vomerine odontophores and quadratojugals. *Megaelosia* is at least twice as large as *Hylodes* and some authors (e.g., Noble, 1931; Cochran, 1955) questioned generic separation of the "giant" species. Lynch (1971) showed *Megaelosia* to differ prominently from

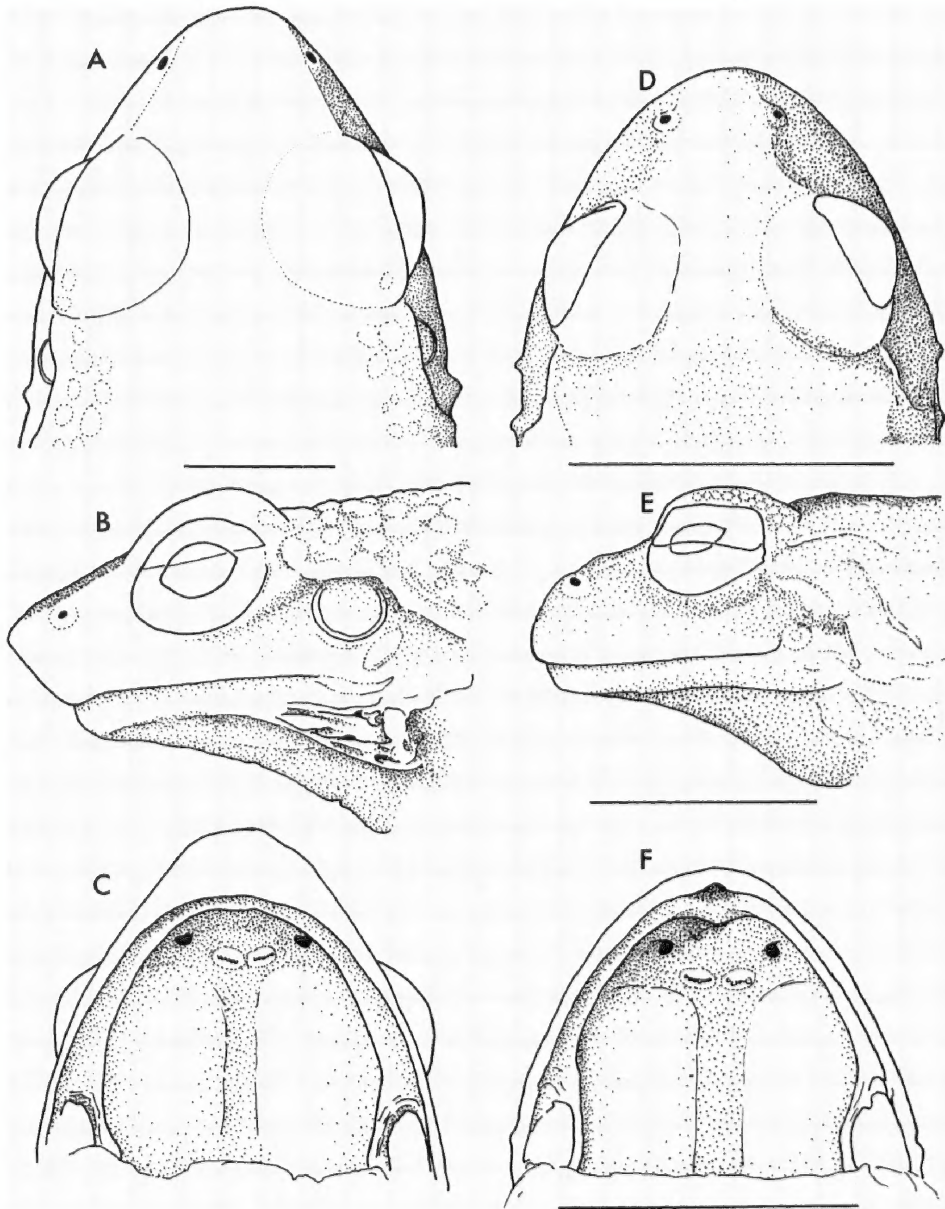


FIG. 2. (A,B,C) *Hylodes asper*, AMNH 52187; (D,E,F) *Dischidodactylus duidensis*, AMNH 23192. Lines equal 5 mm.

Crossodactylus and *Hylodes* in terms of the disposition of cranial bones (the maxillary arch is prominently enlarged and the squamosal abuts the maxillary arch; the teeth are large and fanglike). *Crossodactylus* differs from *Hylodes* and *Megaelosia* in having a ranoid-like condition of the distal tendons of the thigh muscles (Noble, 1922), whereas *Hylodes* and *Megaelosia* have a typical bufonoid condition (as do all other Neotropical leptodactylids). *Elosia duidensis* exhibits the bufonoid condition in which

the tendon of the m. semitendinosus passes ventral to that of the m. gracilis.

Elosia duidensis cannot be an elosiine because it lacks the distinctive suite of traits that characterize the Elosiinae (toe fringes, flaplike tarsal fold, round palmar tubercle, protruding snout and sharp canthi, prominent tympana, smooth skin on the venter, and the scutes atop the digital pads). The digits of *E. duidensis* lack scutes and instead have deep grooves which define scutelike regions (fig. 3), whereas

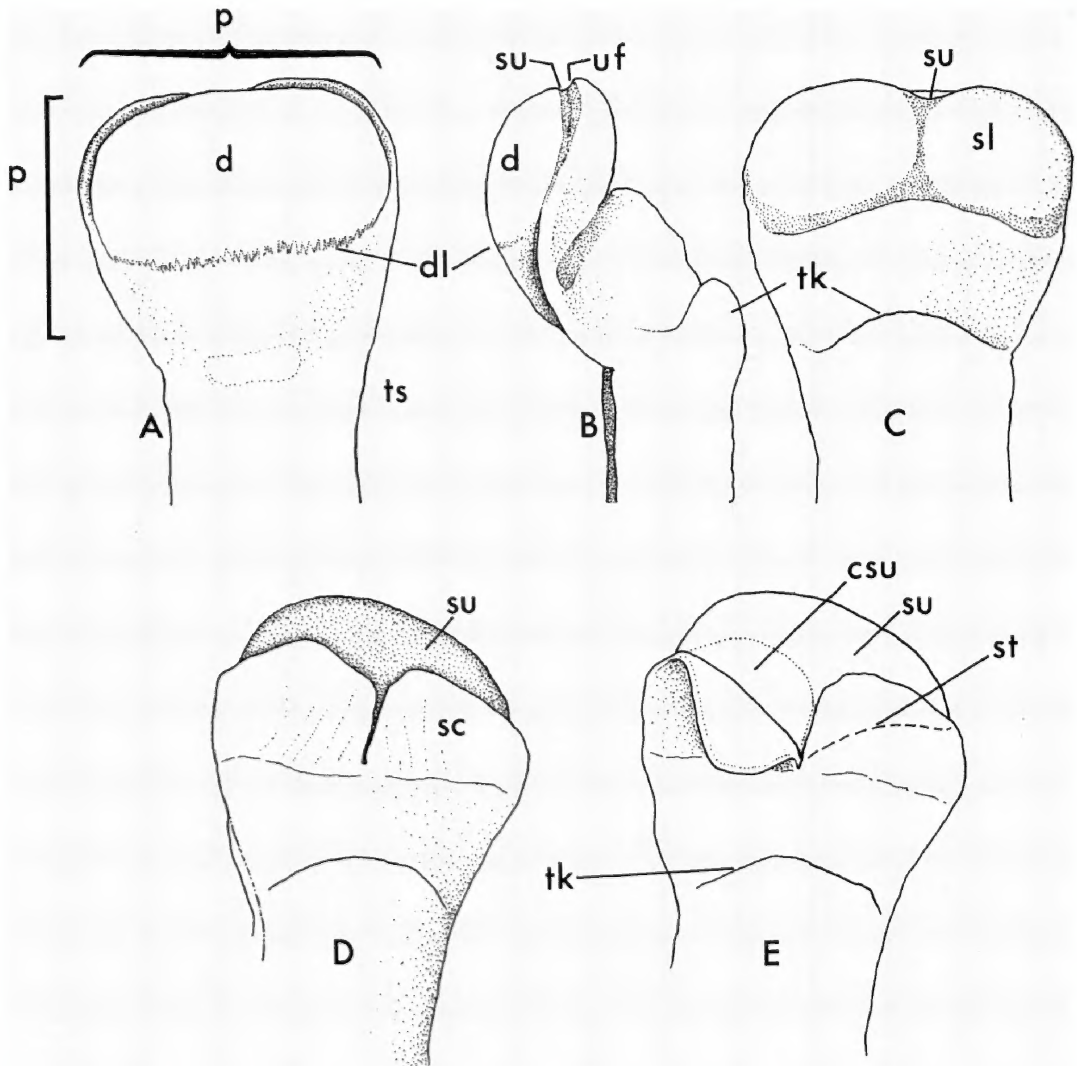


FIG. 3. (A,B,C). Ventral, medial, and dorsal views of toe IV of right foot of *Dischidodactylus duidensis* (AMNH 23194). (D,E) Dorsal views of toe III (left foot) of *Petropedetes natator* (AMNH 84606). In E, the lateral scute is folded back. Key to abbreviations: csu, concealed subunguis; d, disc; dl, posterior disc limit; p, pad; sc, scute; sl, scute-like structure; st, suture line; su, subunguis; tk, terminal knuckle; ts, terminal subarticular tubercle.

the scutes of elosiines are flaplike structures lying atop the subunguis. In *E. duidensis*, as in frogs of the genus *Eleutherodactylus*, the subunguis is restricted to the tissue in the terminal groove across the tip of the digit.

Elosia duidensis cannot be a ceratophryine because it lacks a vertebral shield, Ceratophryine-type ilium, and a dermostosed and casqued skull. Unlike the leptodactylines, *E. duidensis* lacks a bony sternum (or sternal style). No feature of *E. duidensis* precludes its assignment to the Telmatobiinae although the finger tips are unique within that subfamily (as well as in the family Leptodactylidae). Lynch (1978) recognized six tribes within the Telmatobiinae (Batrachylini, Calyptocephalellini, Eleutherodactylini, Grypiscini, Odontophrynini, and Telmatobiini). In our current state of knowledge, only the Eleutherodactylini can accommodate *Elosia duidensis*.

DISCHIDODACTYLUS, NEW GENUS

TYPE SPECIES: *Elosia duidensis* Rivero, by present designation.

DIAGNOSIS: An eleutherodactyline genus differing from all others in having scutelike regions on the dorsal surface of each digit. Differing from *Amblyphrynus*, *Holoden*, *Hylacophryne*, *Ischnocnema*, and *Phrynopus* in having well-developed T-shaped terminal phalanges and digital discs.

To facilitate comparison with other leptodac-

tyloid genera, the character statements listed by Lynch (1971) for 57 Recent genera are given below for *Dischidodactylus*. The numbered sequence follows Lynch (1971): 1) sternum cartilaginous, relatively small (comparable to fig. 33C in Lynch 1971, p. 59), not bifurcate; 2) dermostosed vertebral shield absent; 3) transverse processes of vertebra III wider than those of other vertebrae but not expanded in sense of those of ceratophryine or odontophrynine leptodactylids; 4) cervical cotylar arrangement type I; 5) cervical and second vertebrae not fused; 6) cranial bones not dermostosed or exostosed; 7) omosternum small, cartilaginous; 8) sacral diapophyses not dilated, deflected posteriorly; 9) maxillary arch toothed, teeth pedicellate, blunt; 10) alary processes of premaxillae directed posterodorsally, relatively narrow at base; 11) palatal shelf of premaxilla bearing prominent palatal process, not dissected; 12) facial lobe of maxilla moderately deep; 13) palatal shelf of maxilla relatively narrow, pterygoid process moderate-sized; 14) maxillary arch complete; 15) nasals relatively small, separated medially; 16) nasals not in contact with maxillae or pterygoids; 17) nasals not in contact with frontoparietals; 18) frontoparietals narrowly separated along midline, exposing long, narrow fontanelle; 19) frontoparietals not exostosed; 20) frontoparietal and prootic not fused; 21) temporal arcade absent; 22) epiotic eminences low; 23) cristae paroticae stocky, narrow; 24) zygomatic ramus of squamosal

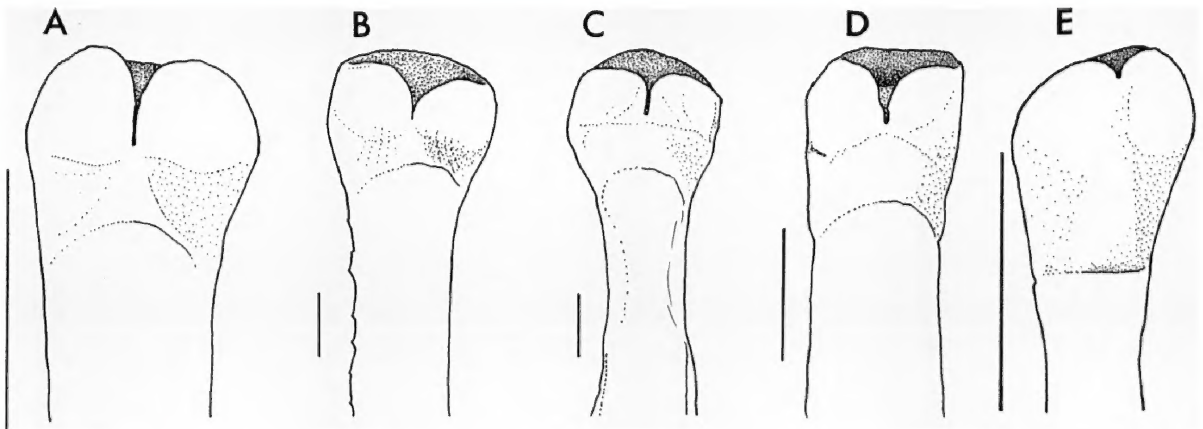


FIG. 4. Dorsal views of toe IV (left feet) in (A) *Colostethus* sp., JDL 10924; (B) *Megaelosia goeldi*, AMNH 70249; (C) *Petropedetes natator*, AMNH 84605; (D) *Taudactylus eungellensis*, AMNH 87894; (E) *Eleutherodactylus parvus*, KU 92831. The subunguis is stippled. Scales equal 1 mm.

long, pointed, widely separated from maxilla; 25) otic ramus of squamosal short, expanded medially into narrow otic plate; 26) squamosomaxillary angle ca. 70°; 27) columella present; 28) vomers toothed, separated medially, odontophores posterior and medial to choanae; 29) palatines broad, not in median contact; 30) sphenethmoid apparently not divided, extending anteriorly to front edge of nasals; 31) anterior ramus of parasphenoid pointed, not reaching palatines, not keeled; 32) median ramus of pterygoid not reaching parasphenoid alae, alae at right angles to anterior ramus of parasphenoid; 33) pterygoids slender, anterior rami long but widely separated from palatines, median rami short; 34) occipital condyles small, not stalked; 35) mandibular odontoids not developed; 36) terminal phalanges T-shaped; 37) alary processes of hyoid plate obsolete; 38) m. petrohyoideus anterior and m. sternohyoideus insert on lateral edge of hyoid plate; 40) m. depressor mandibulae in two slips, a small pars tympanicus and a large pars scapularis; 41) pupil a horizontal ellipse; 42) males with non-spinous nuptial pad on thumb; vocal sac single, subgular; 43) no obvious gland development; 44) tongue round, posterior border not adherent; 45) toes partially webbed; digit tips bifurcate; tarsal fold narrow; outer metatarsal tubercle present; 46-47); 48) eggs large (1.9-2.4 mm.), not pigmented; 49) one adult male 22.5 mm. SVL, one adult female 28.5 mm. SVL; 50) tympanum concealed.

CONTENT: Monotypic.

ETYMOLOGY: Greek (*dischidos*) + (*dactylus*) meaning divided toes; in reference to the dissected ungual flap characteristic of *D. duidensis*. The generic name is masculine.

REMARKS: Recognition that *Dischidodactylus duidensis* is an eleutherodactyline rather than an elosiine eliminates a biogeographic enigma but contributes little to our understanding of eleutherodactyline or leptodactylid frog phylogeny. The Eleutherodactylini is now comprised of some 430 species in 12 or 13 genera, viz., *Amblyphrynus* (two species), *Dischidodactylus* (one species), *Eleutherodactylus* (ca. 380 species), *Euparkerella* [three species were recognized by Lynch, 1976a; Heyer, 1977, placed the two Amazonian species in the genus *Phyl-*

lonastes], *Holoaden* (two species), *Hylactophryne* (three species), *Ischnocnema* (three species), *Phrynopus* (14 species), *Phyzelaphryne* (one species), *Sminthillus* (one species), *Syrrhophus* (14 species), and *Tomodactylus* (nine species).

Amblyphrynus appears to be an offshoot of the *sulcatus* group of *Eleutherodactylus* (Lynch, 1975a); *Sminthillus*, *Syrrhophus*, and *Tomodactylus* appear readily derived from northern *Eleutherodactylus* (Lynch, 1971); *Phrynopus* appears derived from one or two *Eleutherodactylus* stocks (Lynch, 1975b); and although geographically widely separated, *Hylactophryne* and *Ischnocnema* appear to represent an ancestral stock from which *Eleutherodactylus* (and *Amblyphrynus*, *Phrynopus*, *Sminthillus*, *Syrrhophus*, and *Tomodactylus*) are derived (Lynch, 1971, 1975a).

Not associated above are the genera *Dischidodactylus*, *Euparkerella*, *Holoaden*, *Phyllonastes*, and *Phyzelaphryne*. Heyer (1977) considered *Phyllonastes* and *Phyzelaphryne* to be independent derivatives of *Eleutherodactylus*. *Euparkerella* and *Holoaden* are dissimilar to one another and to all other genera of the tribe (except that *Euparkerella* and *Phyllonastes* share the reduction in the phalangeal formula). *Dischidodactylus* has unique digit pads. Superficially, these digits resemble those of the frogs of the *binotatus*, *lacteus*, and *parvus* groups of *Eleutherodactylus* (Lynch, 1976b; fig. 4).

DISCUSSION

The presence of a pair of dermal scutes on the dorsal surfaces of each digital pad was cited as characteristic of each of three frog groups by Noble (1931)—the dendrobatids (p. 507, as dendrobatine brachycephalids), the elosiines (p. 504, as elosiine bufonids), and the petropedetines (p. 520, as petropedetine ranids). Liem and Hosmer (1973) figured the toes of three species of *Taudactylus* (Myobatrachinae, Leptodactylidae) and noted that the genus is characterized by "expanded digital discs with a median longitudinal groove dorsally. . . ." (Liem and Hosmer, 1973, p. 437). Lynch (1976b) described the digits of frogs of three species groups of southeastern Brazilian *Eleu-*

therodactylus as having an indented ungual flap. The digits of each of these frogs are similar (fig. 4) in having a median slit defining two flaplike structures. The flaps (= scutes, fig. 3) are undercut in all but the *Eleutherodactylus* which appear to exhibit a rudimentary condition.

The taxa share what is presently presumed to be a derived character-state. Noble (1926, pp. 7-9) and Lynch (1971, p. 164) tacitly considered the sharing of the state in dendrobatids and elosiines as evidence of relationship. Noble (1931, pp. 520-21) specifically cited the co-occurrence of the state in dendrobatids and petropedetine ranids as an example of parallel evolution; his failure (Noble, 1931, pp. 504, 507) to remark upon the co-occurrence in dendrobatids and elosiines reflects his conviction that the two groups are related.

Griffiths (1959, p. 482) considered Noble to have asserted the relationship on the basis of the shared state and noted "It should be recalled, however, that identical pads occur in petropedetine ranids. . . ." Griffiths's (1959) remarks are ambiguous. One can easily imagine that he was simply emphasizing Noble's remarks about parallel evolution or that he was extending it to embrace dendrobatids, elosiines, and petropedetines. However, he continued (pp. 482-83) his argument that dendrobatids are ranoids by citing a similarity in the breeding habits of dendrobatids and arthroleptine ranids. The juxtaposition of this remark could lead one to think Griffiths was implying ranoid relationships for dendrobatids (at least in part) because dendrobatids and petropedetines shared the digital scute character-state.

The function of the scutes remains unknown (Noble, 1926, p. 7) although Griffiths (1959, p. 482) termed them glandulo-muscular organs and suggested that they facilitated adhesion to foliage. Noble and Jaekle (1928) did not remark on the histology of the scutes in the dendrobatid (*Colostethus latinasus*) or the elosiine (*Megaelosia bufonia*) they examined but did note (p. 280) that modified epidermis was found on the subarticular tubercles of these frogs.

Frogs having digital scutes are presently referred to five family groups belonging to at

least two families (following Griffiths, 1963) or as many as four families (following Duellman, 1975, and Savage, 1973). Citing the presence of scutes as evidence of relationship is obviously premature because this state has evolved no fewer than four times (if dendrobatids are derived from elosiines and if petropedetines and dendrobatids are not sister groups).

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